electrically insulative. Since the force **46** is capable of being released or removed, the electrical structure of FIG. 3 facilitates repairing or upgrading in the field because substrates **32** and **34** can be readily decoupled by release or removal of the force **46**.

In an embodiment of the present invention, the dielectric core **40**, the dielectric jacket **44**, and the conductive wiring **42** are each sufficiently compressible so as to accommodate up to about 8 mils of composite variability that includes a planarity of a surface **25** of the substrate **32** and a planarity of a surface **26** of the substrate **34** which is opposite the surface **25** of the substrate **32**. For example, if the substrate **32** is an electronic module then the variability in planarity of the surface **25** may be in a range of about ½ mil to about 6 mils, and if the substrate **34** is a printed wiring board then the variability in planarity of the surface **26** may be in a range of about ½ mil to about 2 mils. Thus, the dielectric core **40**, the dielectric jacket **44**, and the conductive wiring **42** are each compressible in a direction that is parallel to an axis of the button (i.e., in a direction **54** or **55**).

The dielectric material of the dielectric core **40** or the dielectric jacket **44** may be an elastomer, and a compliance of an elastomer is related to material hardness on the Shore scale. Accordingly, the dielectric material of the dielectric core **40** or of the dielectric jacket **44** may, in particular embodiments of the present invention, have a hardness between about 37A and about 56D on the Shore scale.

Representative materials for the dielectric core **40** or the dielectric jacket **44** include: polytetrafluoroethylene (PTFE), expanded polytetrafluoroethylene, Hylene® TPE 9300C (Dupont), Hytrel® 4069 (Dupont), Teflon® PFA 350 (Dupont), Pellethane® 2102 (Dow), GTPO

8202 GITTO Global (Dupont), GTPO 8102 GITTO Global (Dupont), FEP 100 (Dupont), Chemigum (Goodyear), Versaflex® OM 1040 (GLS Corp.), Dynaflex® G7702 (GLS Corp), Dynaflex® G7722 (GLS Corp.), Santoprene® 8271-55 (Advanced Elastomer Systems), Dyneon® FC 2120 3M 5100. The dielectric core **40** and the dielectric jacket **44** may include a same dielectric material or different dielectric materials. In embodiments of the present invention, the dielectric core **40** has a diameter between about 10 mils and about 20 mils.

Representative materials for the conductive wiring **42** include copper, copper alloys (e.g., BeCu, phosphor bronze), nickel, palladium, platinum, and gold. To reduce or eliminate corrosion, the end contacts **47** and **48** of the conductive wiring **42** may be coated with a noble metal such as, *inter alia*, gold. In embodiments of the present invention, the conductive wiring **42** has a diameter between about 1 mil and about 5 mils.

FIGS. 4-11 depict steps in a fabrication of a conductive button such as the conductive button **38** in FIG. 3.

FIG. 4 depicts a perspective view of a dielectric core **50**, in accordance with embodiments of the present invention. The dielectric core **50** includes a dielectric material such as the dielectric material of the dielectric core **40** described *supra* in conjunction with FIG. 3. The outer surface of the dielectric core **50** has grooves **51** oriented axially in the direction **54** or **55**, said directions **54** and **55** being parallel to the axis (or axial direction) of the dielectric core **50**. The grooves **51** accommodate any hyperelasticity of the dielectric core **50** (or of the dielectric jacket **59** in FIG. 8, described *infra*) by providing space for the dielectric material of the dielectric core **50** to deform into. An alternative to the grooves **51** for accommodating

hyperelasticity of the dielectric core **50** (or of the dielectric jacket **59** in FIG. 8) is an axial through hole in the direction **54** or **55** at a radial center **52** of the dielectric core **50**. The axial through hole may be created by forming the dielectric core **50** around a solid wire and subsequently removing the solid wire to form the through hole. The solid wire provides a stiffening member during formation of the dielectric core **50** and during placement of conductive helical wiring **53** and **56** (see FIG. 5 discussed *infra*). The solid wire may be removed before or after the dielectric core **50** is cut to length (see FIG. 10 and accompanying discussion *infra* relating to cutting conductive rod **60** which contains a dielectric core). The solid wire may be retained within the dielectric core to serve as an additional electrical path between two opposing electrically conductive pads (e.g., pads **33** and **35** of FIG. 3). Another alternative for accommodating the hyperelasticity includes having the dielectric core **50** of FIG. 4 include a foamed material having internal voids or bubbles into which the dielectric material of the dielectric core **50** may deform.

The dielectric material of the dielectric core **50** and dielectric jacket **59** (see FIG. 8) may have other properties, such as: shrinking in length (i.e., in the direction **54** or **55**) during exposure to heat or ultraviolet radiation; or bonding together during exposure to heat or ultraviolet radiation.

FIG. 5 depicts conductive wiring **49** helically wound around the dielectric core **50** of FIG. 4. The conductive wiring **49** includes conductive wiring **53** helically wound in a clockwise direction and conductive wiring **56** helically wound in a counterclockwise direction. The scope of the present invention includes conductive wirings **53** and **56** both present, and alternatively